

Ramp Metering and Integrated Traffic Management



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Introduction

1. What is Ramp Metering (RM)?
2. Current Deployment
3. Ramp Metering Task force (RMTF)
4. Integrated Traffic Management (ITM)

What is Ramp Metering?

- **RM is.....** *“a traffic management tool that regulates the flow of vehicles joining the motorway during busy periods; the aim being to prevent or delay the onset of flow breakdown”*

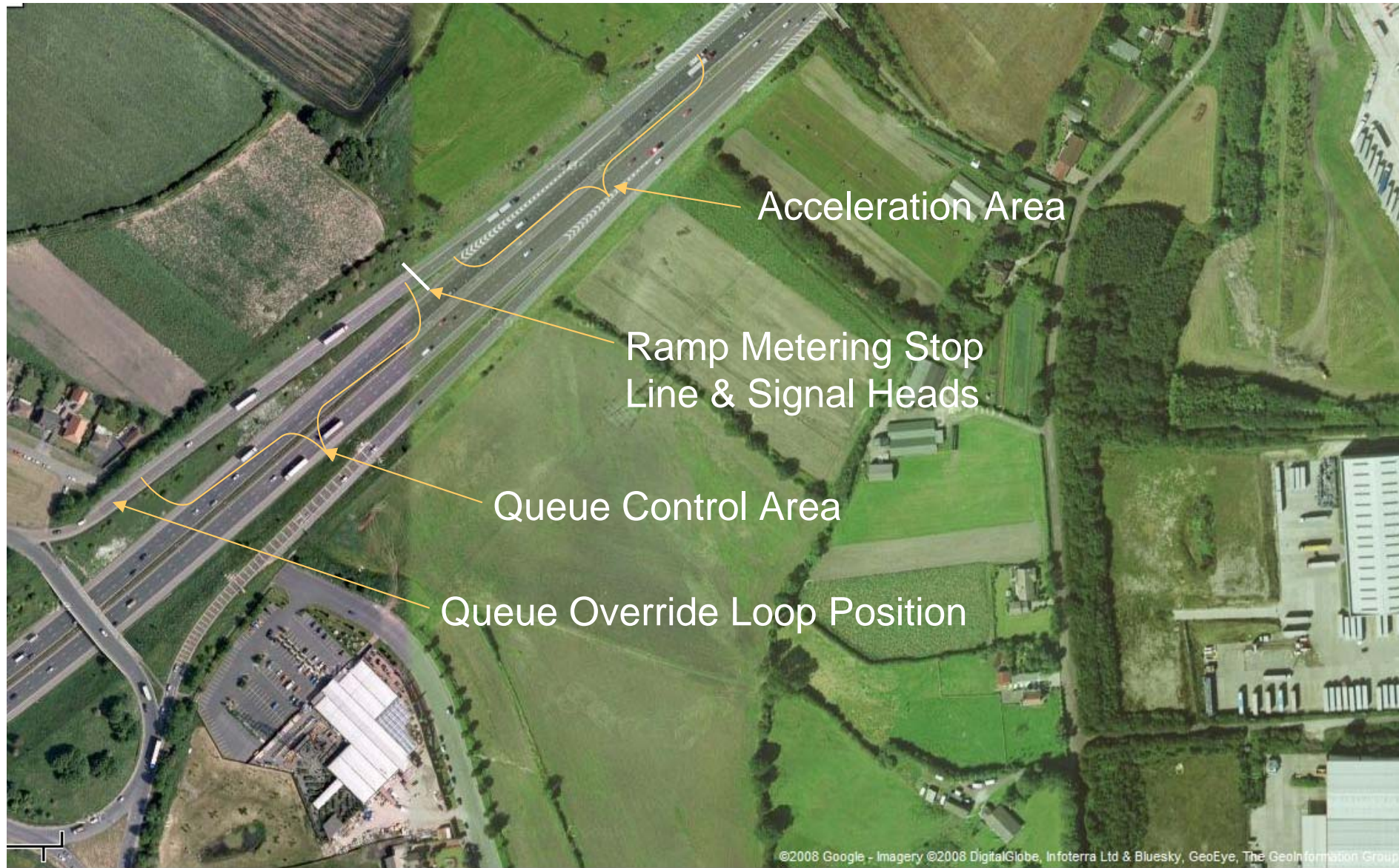
Benefits include...

- Ease of congestion & improvement in traffic flows
- Higher throughput during peak periods
- Smoother, more reliable journey times

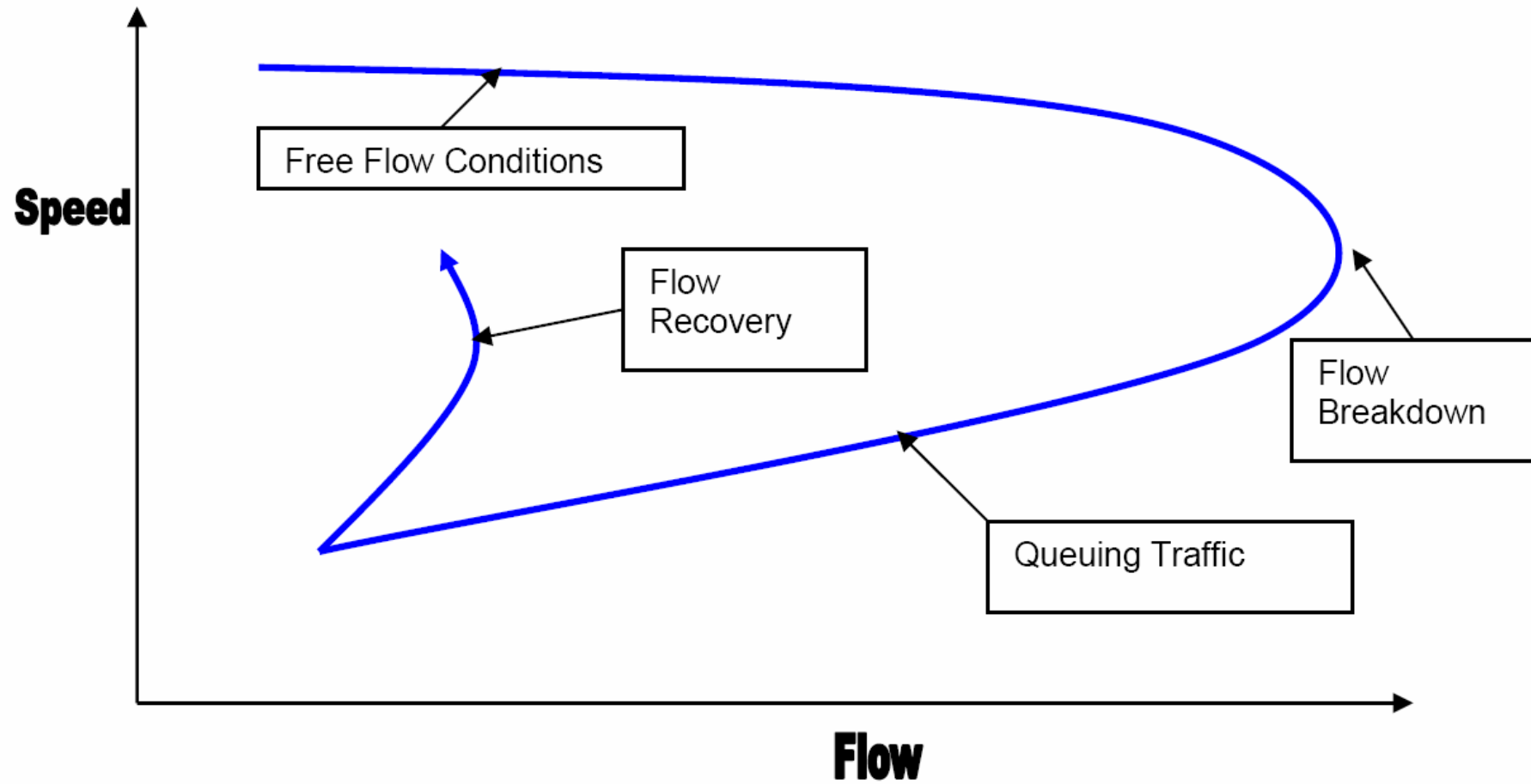
Which helps to...

- Reduce the risk of accidents
- Improve the environmental conditions:
 - Noise reduction
 - Improved fuel consumption

Typical Site Infrastructure



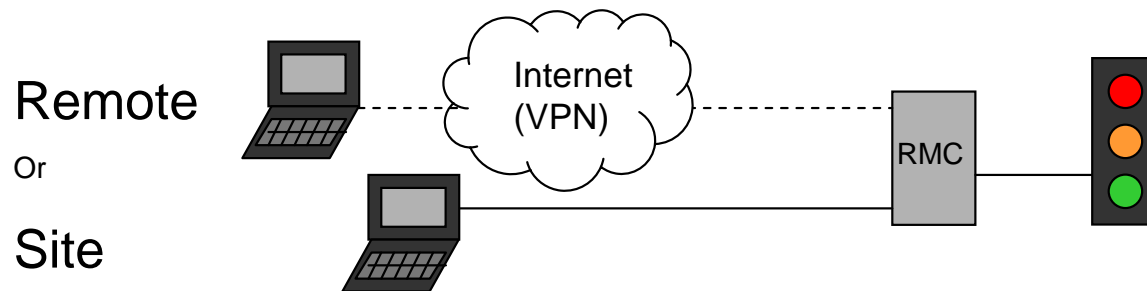
Operation



Calibration Process

Site Specific process

1. **Initial Calibration** – Based on traffic data and site geometry, allows safe switch on
2. **Main Calibration** – Conducted during operation, can be done remotely or on site



3. **Optimisation** – Small changes made after sustained period of operation
4. **Performance Review** – Carried out periodically by the Ramp Metering Task Force

Initial Deployment

Trial Sites

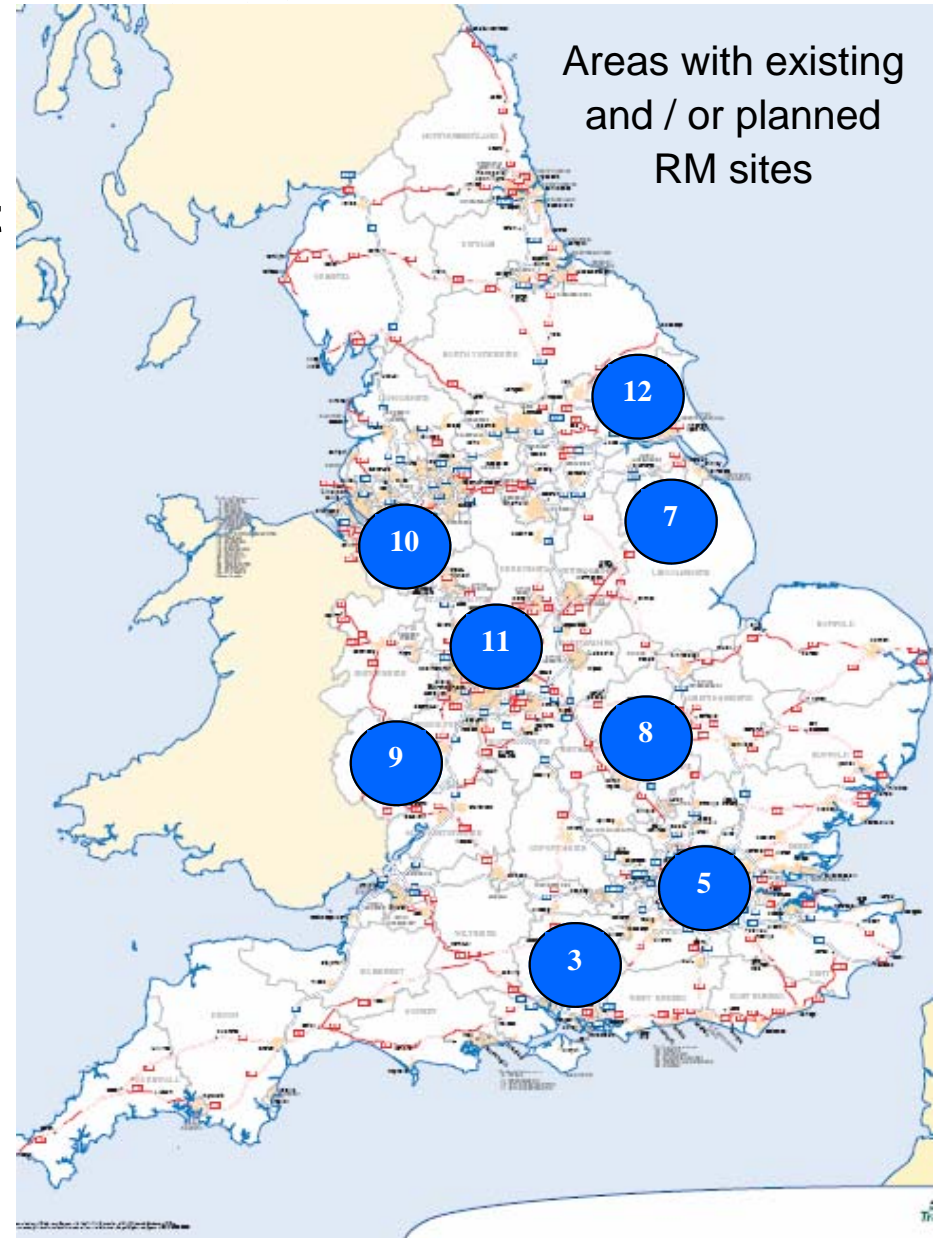
- M6 Junction 10 (May 1986)
- Ramp Metering Pilot Scheme (RMPS) (2000) - *M27 & M3*
- Motorway Access Management (RMIP Phase 0) - *Areas 9, 10, 11 & 12*

Proven Benefits from Phase 0

- Reduction in mainline journey times of up to 40%
- Average mainline journey times improvement of 13% across all sites
- 7.5% increase in downstream speeds

Further Deployment

- **Ramp Metering Implementation Project**
 - Phase 1 - 24 sites
 - Phase 2 - 27 sites confirmed
- **Active Traffic Management Pilot (ATM)**
 - 6 Sites – Operational as of 08/10/08
- **Birmingham Box ATM**
 - 3 New Sites



Ramp Metering Task Force (RMTF)

- Provides a focal point for all Ramp Metering schemes
- A need to ensure consistency of approach and that best practice is adopted
- Primary functions of the RMTF
 1. Provision of technical and design guidance
 2. Change control
 3. Monitoring of Ramp Metering sites
 4. Site & Technical support to projects delivering Ramp Metering

Site Monitoring & Site Reviews

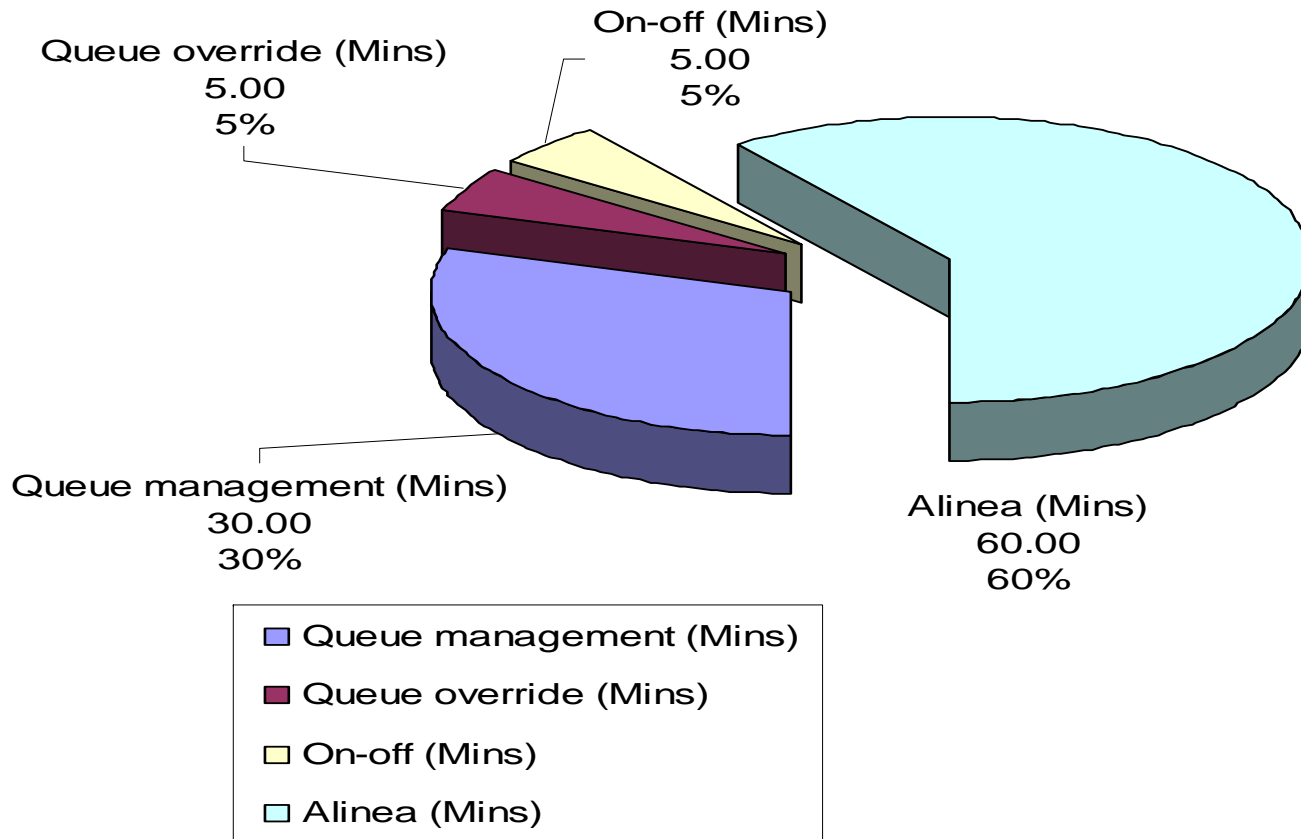
Monitoring

- RMTF remit to review all RM sites within a year
- Scoring based on Ideal Operation

Reviews

- Automated process
- One month worth of data reviewed
- Results issued to relevant HA Area teams
- Recommendations to be acted on by Area Teams who may call on RMTF expertise.

Performance Reviews



Assessment Criteria

- Switch On
- ALINEA
- Queue Management
- Queue Override
- Switch Off
- Algorithm Control

Review Reports



Ramp Metering Task Force
Site Monitoring Report
September 2008

Ramp Metering Task Force Site Monitoring Report

Site: M6 J9 SB

Reference: 718550/DOC/015

Introduction

This report outlines the findings of the Ramp Metering Task Force site review process at the given site. This process uses site specific data logs collected from the Ramp Metering Controller at the given site for the days detailed below. Details of the assessment process can be found in RMTF - Review Process - Guide for Area Teams (718550DOC014)

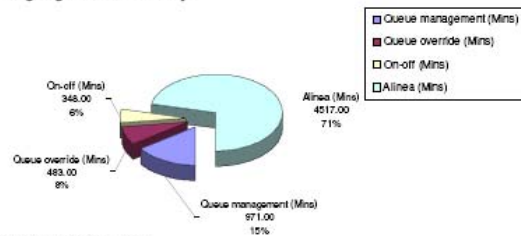
Dates

This review was carried out on 14 days of data between 16th April and 20th May 2008.

Assessment Scores

Category	Score	Comment
Signal Timings & Release Levels	6	See comments below
Alinea - Desired Occupancy	8	No action required
Queue Management	9	No action required
Queue Override	8	No action required
Switch On	6	See comments below
Switch Off	5	See comments below
OVERALL SCORE	7	See final recommendations

Controlling Algorithm Summary



Pie Chart Comments

Site operating predominantly in ALINEA mode with a low proportion of QO. Site is spending a higher than expected proportion of on time in Switch On/Off mode.



Ramp Metering Task Force
Site Monitoring Report
September 2008

Overall Comments

This is a short, two lane uphill slip road with a major motorway diverge just downstream of the merge area. This results in a high volume of traffic in lanes one and two of the mainline during the peak period which results in a weaving problem. Due to the topology of the slip and the gradient at the stop line the safe operating speed is set at 70kph which is relatively low. This means the system cannot turn on until the congestion has backed up from downstream sufficiently to slow the traffic upstream of the merge.

Signal Timings and Release Levels

Over the monitoring period the slip flow requested is on average higher than the actual flow seen down the slip road.

Switch On

The minimum switch on occupancy for this site is significantly lower than is typical due to the constraints of the site topology.

Switch Off

This score is expected due to the nature of the flow recovery at the end of the peak period.

Final Recommendations

This site is generally operating well as indicated by the high overall score.

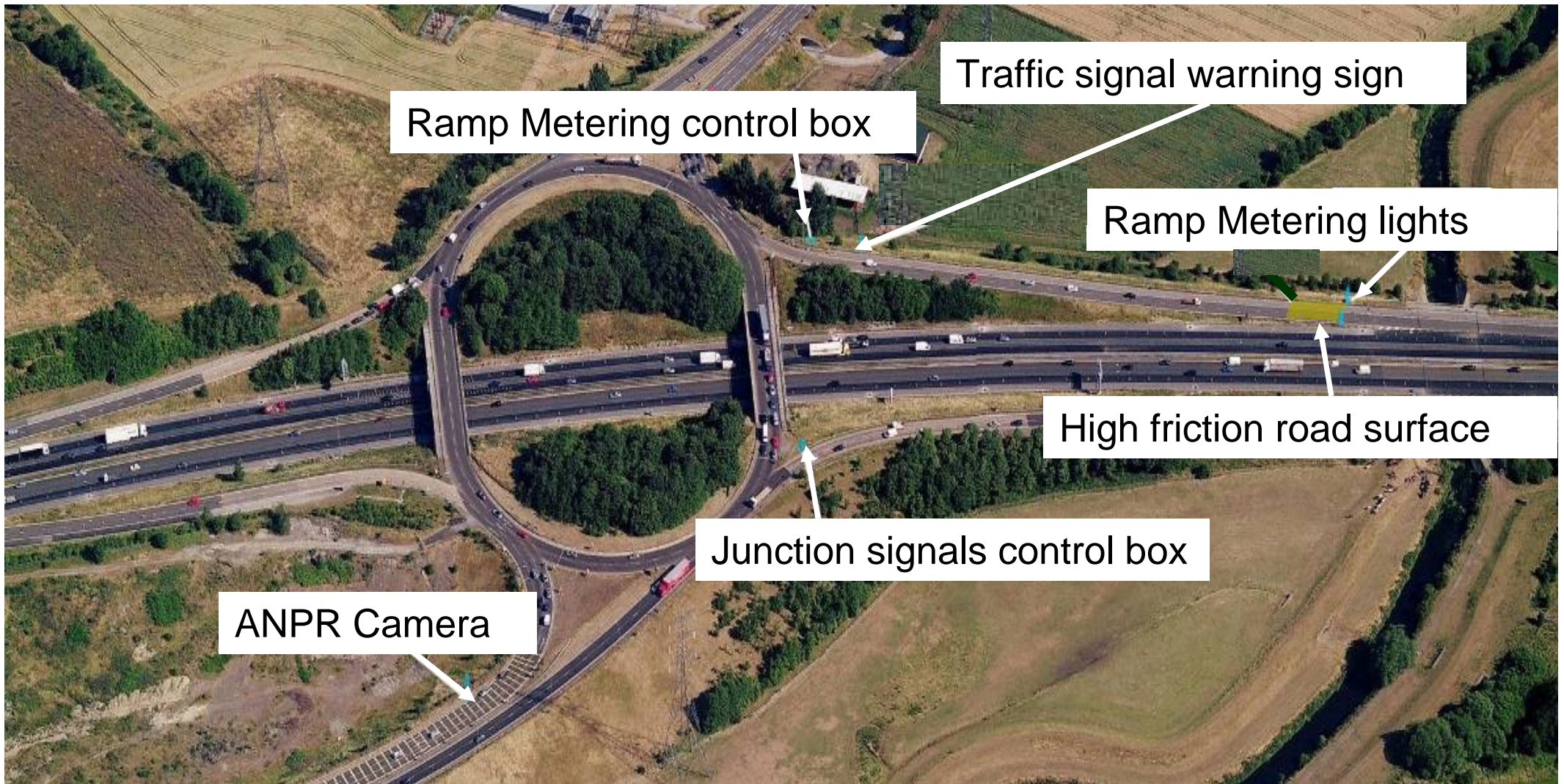
The following may offer slight improvements in system performance although further benefits to journey times will be minimal:

- Review of signal timings and release levels to improve correlation between desired and actual flow down the slip road.
- Review of Switch Off process to improve response time.

It is recommended that this site is next reviewed within the next 12 months, and that calibration settings remain unchanged unless an unforeseen change in traffic conditions occurs.

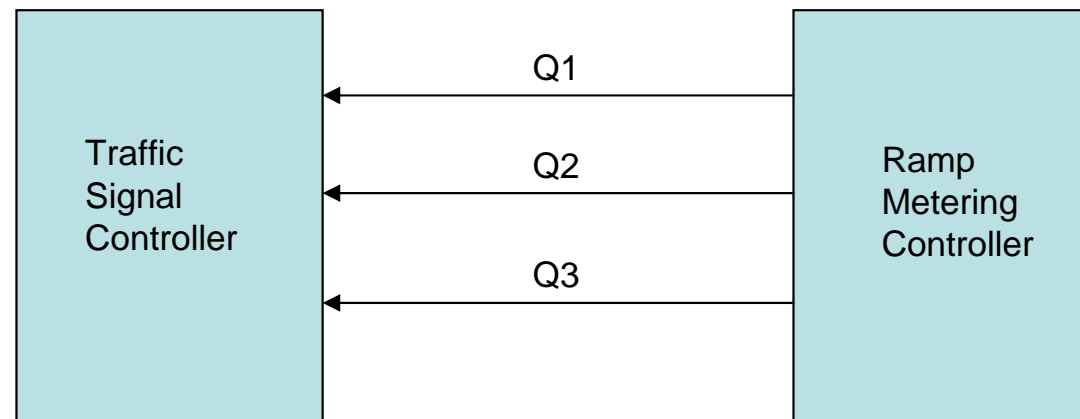
It should be noted that the implementation of ATM at this site (under the BBATM project) will result in a change in traffic conditions on the Main Carriageway. The required recalibration of the site will be completed as part of the BBATM project.

Integrated Traffic Management - ITM



Why is ITM required?

- Success of Ramp Metering is limited by the capacity of the slip road to store the traffic.
- Queue Override sets high green times allowing larger platoons on to the main carriageway.
- ITM provides holistic approach to Traffic Management.
- Integrates the operation of Ramp Metering Controller with the operation of adjacent Traffic Signal Controller(s) to better manage the combined network.



ITM Operation

- Requires Commitment of both local authority and the Highways Agency
- Provides benefit to all purpose network as well as the motorway
- Reducing ramp flow increases ramp queue
- Conflict between ramp metering (ALINEA) and queue management
- Platoon arrival needs to be managed
- Incrementally adjust the flow arrival rate of traffic at the slip to manageable platoon sizes
- Queue control needed to prevent disruption to local traffic

ITM - Trial

M1 J33 South Bound

Fixed time



ITM Pilot – Results

Average change in journey times across all links on the junction:

-8.7%

(All Periods)

-9.8%

(PM Peak)

Change in Ramp Metering performance:

-9.1%

(RM Only)

-14.7%

(RM and ITM)

ITM pilots and standards



MOVA:
M5 J1 NB

SCOOT:
M1 J40 NB

Fixed Time:
M4 J8/9 EB

Standard guidance for ITM installation
to be issued July 2009.

Questions?

